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Abstract : Numerous studies suggest relationships between foraging behavior in marine predators and oceanographic features. These features, which can include frontal systems and thermal structure, are suggested to impact the distribution of marine predators by physically forcing prey aggregations. To date, these relationships are based primarily on associations of predator distributions with oceanographic features. Key to understanding these foraging interactions is the identification of which features are associated with specific foraging behaviors, and how predators respond to changes in oceanographic features and prey distributions. One problem with the use of remote sensing data for these purposes has been mismatches in resolution between oceanographic data and animal foraging behavior. Recent advances in the quality of environmental data collected by animal-born instruments allows direct comparisons of the physical environment with behavior at appropriate spatial and temporal scales. We examined water temperature and depth measurements from 22 adult female elephant seals foraging on their biannual migrations. Records were obtained between 1996 and 2003 using a variety of Wildlife Computer recorders that sampled temperature concurrently with depth. Logistic regression revealed that for most animals the magnitude of SST gradients was associated with the prevalence of foraging-type dives. Hierarchical agglomerative cluster analysis was used to classify the thermal profiles of individual dives into distinct water types. Diving behavior varied significantly between water types with marked behavioral changes evident at transitions between water types. Comparisons of temperature differences between the descent segments of adjacent dives revealed movement through fronts associated with areas of slow transit, increased frequency of foraging-type dives and foraging success. These analyses suggest that females frequently move back and forth across thermal fronts, then forage on the cold water side of the fronts. These findings suggest that water thermal structure is one important component of the foraging strategies of female northern elephant seals.